A MASS BALANCE STUDY OF ELEMENTAL CHANGES DURING HYDROTHERMAL ALTERATION IN THE ARASH SYENITE, CENTRAL IRAN

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Arash syenite is located in Bafq metallogenic province, west of Esfand Fe-apatite mine (Central Iran) and intrudes the infracambrian volcanic and sedimentary rocks. It is non-uniformly composed of K-feldspar, plagioclase and clinopyroxene with accessory apatite, zircon and rutile; the altered margin lacks pyroxene but contains more abundant zircon and rutile. A chessboard texture which is common in plagioclase attests to metasomatism. Furthermore, plagioclase is invaded by albite veinlets. Pervasive sericitization of plagioclase is the evidence for subsequent hydrothermal alteration event. Dikes from the same syenitic suite show similar mineral compositions but bear neither metasomatic textures nor alteration products.

Percent change of several elements in altered samples were studied relative to fresh equivalent (i.e. syenite dikes) following the method of Nesbitt (1979). Changes in concentrations of major and trace elements are shown in Fig. 6 A and B, respectively. Gains in K (and Rb) and Al with parallel losses in Na and Ca due to sericitization of plagioclase. Decrease in P can be attributed to dissolution of apatite. Increase in Nb and Zr are probably the result of their behaviour as HFSE during hydrothermal alteration.
Donolitization of the precursor carbonates appears to have been a multistage process, in which several types of dolomite from fine-grained to saddle dolomite have been formed, the latest coexisting and coperprecipitating with fluorite and barite. Fluorite precipitation is related to an increase in mCa²⁺⁺ of the fluids which in turn promoted donolitization.

The spread in δ⁸⁷Sr/δ⁶⁶Sr ratios of the gangue minerals of deposits ranges from 0.7086 to 0.7089 compared with 0.7082 for the host dolostones. The data imply that the gangue minerals derived their Sr isotopic composition from and by inference the metals from sources exterior to and distance from the local donolitized carbonates.

Based on field and geochemical investigations an epigenetic model is supported by isotopic ratios of barite, fluorite and dolostone host. The mineralizing fluids originated as evaporite brines mixed with connate water from underlying siliciclastics, the most probable source of the Ba and Sr. These fluids subsequently interacted with an igneous heat source, obtaining their elevated fluorine concentration at depth in a convective hydrothermal system. The most compelling reason is the close proximity to the cryptovolcanic facies structure.

**BTH 94 Hajikazemi, E.**

**SIGNIFICANCE OF SADDLE DOLOMITE FORMATION IN CRETEOUS DONOLITIZED CARBONATES OF WESTCENTRAL IRAN**

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Saddle dolomite occurring in the Lower Cretaceous carbonate strata in westcentral Iran produces information concerning the nature of the fluids and mechanisms responsible for basin metal sulfide mineralization.

Based on depleted δ⁴⁰Ca(-13.5 to -11.0‰) and fluid inclusion freezing and homogenization temperatures, the saddle dolomites occurring with dolostones and associated sulfides have formed from hydrothermal (90 to 110°C) saline (-10%w CaCl₂).

Depleted δ³⁴S (-6.4 to -2.7‰) of saddle dolomites indicate the presence of organically derived carbon, produced by oxidation of hydrocarbons derived from Jurassic shales via thermochemical sulfate reduction. δ⁴⁰Ca of the S-bearing minerals indicates such a process.

Interaction with shales is also indicated by high δ⁸⁷Sr/δ⁶⁶Sr ratios of saddle dolomite (0.70538 to 0.71048) compared to those of the host dolostones (0.70752 to 0.70918). The overlap in isotope ratios imply isotopic modification and/or recrystallization of dolostones by fluids responsible for saddle dolomite precipitation.

It is concluded that saddle dolomite formed in a hydrothermal system due to thermochemical interaction of organometal-bearing fluids with sulfur-bearing brines. At the early stages of the brines evolution they caused recrystallization of dolomitic sediments.

**BTH 95 Ghazban, Fereydoun**

**TRACE ELEMENTS IN CORALS OF THE PERSIAN GULF AND THEIR ENVIRONMENTAL SIGNIFICANCE**

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Coral reefs tolerate very limited range of environmental conditions such as temperature, salinities and pollutants. Due to extreme temperature and salinities, coral reefs of the Persian Gulf have the worst environmental conditions compare to the other areas of reefal growth. In recent years oil pollution in the Persian Gulf has influenced the ecosystem, increasing environmental extremes. In this study coral reefs are used to evaluate the extent of environmental pollution based on changes in concentrations of toxic elements. Nickel, Vanadium and Cadmium are considered as anthropogenic activities indices.

The sampling of corals were carried out along the Iranian coastal areas from NW end of the Persian Gulf (Kharg Is.) to Strait of Hormuz (Qeshm & Larak Is.). The samples taken from subtidal zone belong to the greater Goniastrea. Using X-ray radiography, growth layers of corals were identified and powdered samples were obtained from each layer and analyzed using (ICP).The results show that concentrations of V, Ni and Cd of different growth layers are constant but the outer layers show an abrupt increase in toxic elements (see figure). The existence of tar ball particles are also observed in the latest growth layer. The higher concentrations of V, Ni and Cd in corals near the strait of Hormuz, could be interpreted due to higher rate of circulation of oil-polluted waters.

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